

albis notata; serieque marginali lunularum argenteo-albarum.

Exp. alar. 4 unc. vel 102 mill.

Hab. Bolivia (Mr. Bridges).

Above, all the wings coppery-green, inclining to olivaceous; the anterior with a transverse curved macular yellowish band, commencing a little below the costa, beyond the cell, and terminating near the anal angle; between it and the apex three rounded spots of the same colour, and the faint indication of two similar spots within it, between the median nervules. Cilia spotted with white. Posterior wings with a series of greenish yellow lunules near the hinder margin. Cilia between the teeth white.

Below, the anterior wings are black, with green reflection; the apex and outer margin occupied by a broad band of a dull greenish yellow, narrower and macular towards the anal angle; the outer margin very narrowly fuscous, except at the anal angle, where the margin is broader; the cell with two slender whitish lines towards the base. Posterior wings dull greenish yellow; the nervules and a Y-shaped vitta in the cell black; a black band traverses the wing beyond the cell, marked with a series of silvery-white spots between the nervules, all of which are geminate except the first and last. On the margin itself a series of white lunules, bordered internally with black, shading to purplish and green, the black prolonged nearly to the transverse band. Cilia between the teeth white.

Head black, spotted with white.

Thorax bronzy black above; sides yellowish.

Abdomen bronzy green above, yellow at the sides, black, spotted with white below.

In the collection of the British Museum.

Allied to *P. Archidamus*, but easily distinguished by the character given above.

XLII.—*On the Wound of the Ferret, with Observations on the Instincts of Animals.* By ANDREW BUCHANAN, M.D., Professor of the Institutes of Medicine, University of Glasgow*.

HAVING often heard of the remarkable way in which the Ferret destroys its victims, I willingly availed myself of an opportunity presented to me on the 26th of August last (1845), of seeing two rats killed by this animal. I found the common account quite correct, that the Ferret kills by means of a small wound in the neck; but the explanation usually annexed I found quite erroneous, that the Ferret aims at the jugular vein, and destroys life

* Read before the Philosophical Society of Glasgow, and communicated by the Author.

by sucking the blood of its victim. The rapidity of the death was quite inconsistent with so tedious a process as blood-sucking, and the dissection showed the true cause to be totally different, and so very curious, that I have thought it not unworthy of the notice of the physiological section of the Society.

The two rats being put into a large barrel, concealed themselves under some hay in the bottom of it. On the Ferret being introduced, it seemed dazzled with the sunshine, for it took no notice of one of the rats placed right before it; but soon finding the scent, it burrowed under the hay, taking the very track which the rat had just taken, and thus came round directly upon him. The rat, which was of large size, resisted stoutly, but the Ferret, instead of returning the bites it received, seemed entirely occupied with putting itself into a proper position, applying itself to the body of its antagonist, breast to breast, and using the fore paws and head, as if going to embrace it. No sooner had it assumed this position, than it inflicted a wound, which was so instantaneously fatal, that a physiologist might have guessed from that circumstance alone, what the nature of the wound must have been. The rat died without a struggle: and the Ferret immediately disengaged itself from the body, instead of remaining to suck the blood, and soon falling on the track of the other rat, destroyed it exactly in the same manner.

I now proceeded to examine the dead animals. Neither of them exhibited any marks of injury inflicted by the Ferret, except a bloody patch on the side of the neck, under the ear. In the first one which I looked at, there was at the upper part of this bloody patch, or a little below and behind the ear, a very small punctured wound, and on dissecting it carefully to the bottom, I was surprised to find that the sharp dens caninus, by one of which the wound was obviously inflicted, had gone right down to the spinal cord, piercing it between the occiput and the uppermost cervical vertebra. The Ferret therefore destroys its victims by pithing, a process well-known to be the most immediately fatal, to the upper orders of vertebrated animals, of all modes of destroying life: and it employs for the purpose one of its long slender dagger-like tusks, a weapon singularly well adapted to inflict a wound which proves fatal, neither by laceration nor contusion, but by penetrating into the very centre of the nervous system, on which the most important functions of life immediately depend.

The death of the other rat was obviously produced in the same way; but there was no external wound visible on any part of the bloody patch on the neck, the tusk having been inserted into the external ear, and then penetrating the cartilaginous side of the auditory passage had been carried towards the vertebral canal,

which it entered under the occiput, more laterally than in the former case.

It is certainly very remarkable, that instinct, or the promptings of bodily organization, should lead an irrational creature to use its weapons in the very way in which a profound knowledge of the functions of the nervous system teaches that they may be used with the most deadly and instantaneous effect. The cerebro-spinal axis, or great central nervous column, lodged in the elongated cavity of the head and spine, cannot be wounded at any point without interfering more or less with sensation and motion; but the part of this nervous column, on the integrity of which the continuance of life immediately depends, is the medulla oblongata, or part of the column lying intermediate between the head and spine. Wound an animal below this point, and you paralyse his limbs more or less, but life may be protracted for years after such injuries. Wound the animal above this point, and you not only produce palsy, but impair or destroy consciousness and the faculties of the mind. Still, however, just as we see in a man struck down by a fit of apoplexy, the action of the heart and the respiration may go on little or not at all affected. It is on the upper part of the cord that these important functions immediately depend, and hence it is that to the higher vertebrata, a wound inflicted there is the most instantaneously mortal of all wounds, at once destroying consciousness, sense and motion, and arresting the action of the heart and respiratory muscles. It is not a little remarkable that the Ferret should select this very part of the cord into which to thrust his tusk; and serves to show how the promptings of instinct may anticipate the deductions of science.

To those who love to speculate on the mental endowments of brutes, it may not be uninteresting to know how two young Ferrets that had never before seen a rat killed, deported themselves on the occasion. Before putting the old Ferret into the barrel where the rats were, a trial was made with two young ones, her offspring. The untutored creatures, instead of having for their single object to put themselves into the proper position to inflict the death-wound, engaged in conflict with the rats, returning bite for bite; and, although one of the rats had its leg bitten through, they at length beat off their assailants. Still further, after the old Ferret had despatched the first rat, one of the young ones immediately threw itself upon the dead body, assuming the very position and motions which the old one had assumed, and so far as could be judged from there being but one wound, thrusting its tusk into the very same aperture. Did then the young Ferret receive a lesson from the old one? The facts do not at all accord with this hypothesis, for the young one, instead of attending to

the lesson given it, was all the while engaged in skirmishing with the other rat. Besides, the headlong fury with which the young animal threw itself upon the dead body had nothing in it of the caution of an experimental and intellectual act, but partook altogether of the character of a blind impulse—an intense feeling of bodily gratification, impelling the creature to the act which it performed.

The acts which we name instinctive, appear to me to be best explained upon the hypothesis that they proceed from the promptings of bodily organization. The bodily organs of animals are formed in a certain way to adapt them to the performance of certain acts, which acts the animals perform readily and with pleasure to themselves: other acts to which their organs are not adapted, they cannot perform at all, or not without a painful constraint, and therefore they do not perform such acts. One animal goes to sleep stretched upon the ground, finding that to be the position in which there is the most complete repose of the muscular system; another supports itself on one leg, upon a spar, a position which the former animal could not maintain, without the most painful efforts, for more than a few seconds. That position, however, is admirably adapted to the organization of birds, their bodies maintaining their equilibrium in perfect security, and without muscular exertion, by a mechanism which Borelli has explained. According to the same law of the adaptation of organs birds fly, fish swim, quadrupeds walk and run, and every animal uses its weapons, offensive and defensive, in the way in which the Author of nature meant them to be used. This physiological theory of instinct seems to me more probable than that which refers it to innate ideas, or any other peculiarity of mental constitution; or than the extraordinary hypothesis of Lord Brougham*, who refers all instinctive acts to the immediate inspiration of the Deity—the divine mind supplying the place of reason and directing the bodily organs. This is exactly the doctrine of Pope, and with deference to so great a man, seems to me to savour more of poetry than of philosophy.

“Reason exalt o’er instinct as you can,
In this ’t is God directs, in that ’t is man.”

It is commonly said that instinct is independent of all reasoning, education and experience; and it has been assumed as a character of the instinctive acts, that they are performed as perfectly at the first as at any subsequent time. This holds good only among the lowest animals, whose whole actions are automatic, or without any intervention of the reasoning power; but it is so far from being universally true, that it may be affirmed, that in all

* Dissertations on Subjects connected with Natural Theology.

animals capable of reasoning, the instinctive acts are under the control of the reasoning power, and are frequently not performed aright at the first, as in the case of the young Ferrets above-mentioned. The ultimate result, however, of the reasoning process in such cases cannot be doubtful, since the bodily organization operating upon the mind will admit of only one conclusion; and hence, even in the highest species of animals, these instinctive acts are always ultimately performed exactly in the same way.

The instinctive acts which excite our wonder most are such as those we observe among the insect tribes, in which the intervention of reason cannot be suspected, and which are, on that account, the better fitted to elucidate the true nature of instinct. But the wonder with which we regard the workmanship of insects proceeds mainly from an erroneous view of the directing power by which it is carried on. The honey-comb and the spider's web are, without doubt, wonderful in their structure; but they are in no respect more wonderful than the elaborate structures which the microscope displays to us in every tissue of animals and vegetables; even in the mathematical exactness of form, so much celebrated, they are not superior to the regular hexagons which form the epidermis of many plants, and which we find equally regular in the same tissue of certain reptiles. Now, the former structures are not held to be more wonderful than the latter, because they are fabricated by the instrumentality of muscular fibres; for in that point of view we should marvel more at the latter, which are fabricated by less perfect instruments—vessels and cells. The true cause why the former structures have been regarded with most wonder is, that it has been supposed that the action of the muscles which form them must be voluntary—a supposition which implies necessarily the existence of a directing mind. Now, the physiology of the present day gives no countenance to such a supposition. It shows us, on the contrary, innumerable muscular acts in all animals, with which volition has no more to do than with digestion or nutrition. Such acts may originate in external impulses which excite the nervous system, and the acts follow immediately, as if from a physical necessity. They may originate also, as in the case before us, in internal impulses, derived from the organic condition of the tissues of the body, and the changes they are continually undergoing. The two series of structures which we have brought into comparison are therefore to be regarded as the products of the same organizative or plastic force; which, acting in one way, employs vessels and cells for its instruments, and produces, within the body, the innumerable structures of which animals and vegetables are made up; and, acting in another way, employs for

its instruments muscular fibres under the direction of the nervous system, and produces, without the body, structures which bear the same impress of regularity and beauty as those within it, and co-operate with them to the same ends—the preservation of the individual and the species. Corals and other polypidoms may be considered as standing in the very same relation to the swarms of zoophytes which people them, in which the honey-comb does to a swarm of bees. Both are structures external to the bodies of the animals which produce them, and both are the products of the same organizative power; the only difference being, that in the one case this formative power employs its ordinary instruments—cells, and possibly vessels—while in the other it employs the more unwonted apparatus of muscular fibres.

I have more recently had an opportunity of examining several animals killed by the Ferret. I found that instead of there being only one wound, there are always several, as might, indeed, have been inferred from the mechanism of the jaws, and their being armed with four tusks. The wounds are so minute as to be imperceptible externally, unless one of the tusks has pierced the jugular or some other superficial vein, so as to stain the surrounding skin with blood; but as this, although generally, does not always happen, there may be no external mark visible. But, on dissecting off the skin, the wounds become at once apparent in the cellular and muscular substance beneath. The injury done to the upper part of the spine is therefore more extensive than I had at first supposed. It is also less uniform in its seat; as I more than once found that the tusk had pierced the cranium, and gone deep into the back part of the brain. The mode of attack is also very various, according to the relative strength of the combatants; but the struggle is always brief; and the Ferret never remains after it to suck the blood.

From these observations, confirmed as they were in all essential respects by many others made under the eye of an intelligent friend, I was disposed to conclude that the vulgar belief of the Ferret destroying its victims by blood-sucking was erroneous; and that it had most probably arisen from the appearance of the dead animals, which exhibit commonly no mark of injury but a small wound, surrounded by a bloody patch on the neck. Now, the very same appearance would be produced by a leech fastening on the neck: and hence most probably it was inferred that the leech and the Ferret practised the same mode of attack. This opinion has, however, received the sanction of the highest authorities in natural history. Buffon says*, “The Ferret is naturally the mortal enemy of the rabbit. On presenting a rabbit,

* *Histoire Naturelle*, vol. vii. p. 211.

even dead, to a young Ferret that has never seen one before, it throws itself upon the body and bites it with fury ; and, if the rabbit be alive, the Ferret takes it by the neck or by the nose, and sucks its blood." In the 'Dictionnaire des Sciences Naturelles',*, Ferrets are described as being of a most sanguinary nature : "It is even more the blood than the flesh which they seek for their nourishment." MM. Geoffroi St. Hilaire and Fred. Cuvier, the authors of the splendid work 'Histoire Naturelle des Mammifères,' repeat the same opinion :—"The Ferret, in attacking a rabbit, seizes it by a part of the head, masters it, and sucks its blood, and, as soon as satisfied, falls asleep."

As the above quotations refer chiefly to the rabbit, and as it was possible the Ferret might not practise the same mode of attack upon that animal as upon the rat, I resolved to put the matter to the test of experiment. My first trial was made with a full-grown male rabbit, and a Ferret nine months old, which had never seen a rabbit before. The Ferret immediately commenced the attack, but it was always repulsed, and ultimately obliged to retire altogether, the rabbit adopting a very remarkable mode of defence ; for whenever the Ferret came near, he sprung right upwards, and came down with the whole force of his hind legs upon the head of his assailant. I now sent off the rabbit, to be tried with the old Ferret which had killed the two rats, as mentioned above. The distance was too great to admit of my being present ; but I received a full report of what passed from the friend already mentioned, whose zeal in natural science led him to take an interest in the experiment. The rabbit pursued the same tactics in defending himself as before ; and so long as he had free space for his evolutions he came off victorious, as the Ferret could never get an opportunity of laying hold of him. They were therefore put together into a box. There the Ferret soon succeeded in seizing the rabbit across the root of the nose, shaking him, as a dog does, from time to time, and never letting go the hold till the rabbit ceased to live. Instead, however, of despatching him in the course of a few seconds, there was a full half-hour from the commencement till the end of the struggle. It was agreed by all present, that while the Ferret held on by means of her teeth, she sucked the blood flowing from the wound. The dead rabbit being sent to me for examination, I found the vessels as full of blood as usual ; the brain had not been injured ; the bones of the nose and orbit had been pierced ; but the main injury done had been to the eyes, which were completely disorganized and full of blood.

It thus appeared that the idea of the Ferret sucking blood was

* Article Martes, division Putois.

not without some practical foundation. I was, however, at the same time convinced that the observations from which it had been inferred that the animal always causes death by the abstraction of blood, must have been very superficially made. I have been assured by persons well-versed in such matters, that even the rabbit is frequently destroyed by a wound in the neck; and I recollect well, when a schoolboy, of having had a young rabbit destroyed by a weasel, and of the astonishment I felt at seeing upon it, when dead, no mark of injury of any kind, but the mysterious bloody patch and small wound on the side of the neck, described above. The truth seems to be, that whenever the Ferret attacks an animal which it is capable of mastering by main force, it despatches him, not by blood-sucking, but by the most speedy and merciful of all modes of inflicting death—piercing the upper part of the spinal marrow; but that when it is opposed to animals of large size and strength superior to its own, it alters its mode of warfare, seizing them where opportunity offers, and clinging to them till they expire from loss of blood, pain, and exhaustion of strength.

XLIII.—*Additions to the Fauna of Ireland, including a few species unrecorded in that of Britain;—with the description of an apparently new Glossiphonia.* By WILLIAM THOMPSON, Pres. Nat. Hist. and Philos. Society of Belfast.

[Continued from p. 315*.]

MOLLUSCA.

Nassa varicosa, Turt. (sp.). *Tritonia varicosa*, Turt. Zool. Jour. vol. ii. p. 365. pl. 13. fig. 7.

A dead specimen was dredged (depth twelve to fifteen fathoms) off the south entrance to Bantry Bay in May 1846 by Mr. MacAndrew.

Pleurotoma teres, Forb. Ann. Nat. Hist. vol. xiv. p. 412. pl. 2. fig. 3.

One dead specimen was dredged from about fourteen fathoms in Birterbuy Bay, county of Galway, in the summer of 1845 by Mr. Barlee. This gentleman—when accompanied by Mr. Jeffreys—obtained in the same bay very fine specimens of the rare *Pleurotoma Boothii*, Smith (sp.)—*Fusus Boothii*, Wern. Mem. vol. viii. p. 98. pl. 1. f. 1.

* As the marks of doubt placed *after* Bonaparte's Sandpiper and the Sword-fish, in the first part of this communication (p. 311, 314) might convey the erroneous impression that there is uncertainty respecting the species, it seems to me desirable to state, that there is no doubt on that subject. Those marks should rather have been placed *before* the name as expressive of uncertainty about the admission of the species into the Irish Fauna.